Roanoke River Clean-up Plan

Steering Committee Meeting

August 20th, 2014

THE Louis Berger Group, INC.

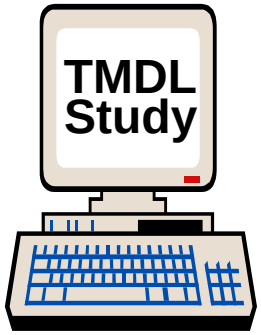
CELEBRATING 20 YEARS
DEQ
STEWARDSHIP SUSTAINABILITY SOLUTIONS

Agenda: Steering Committee Meeting

August 20, 2014

- TMDL and Clean-up Plan Process
- Working Group Reports
- Clean-up (Implementation) Plan Actions
  - Watershed Overview
  - TMDL Review
  - BMP Actions (Revised and New)
  - Staging Implementation and Milestones
  - Technical Assistance
  - Funding
- Project Timeline and Next steps

TMDLs & Clean-up Plans



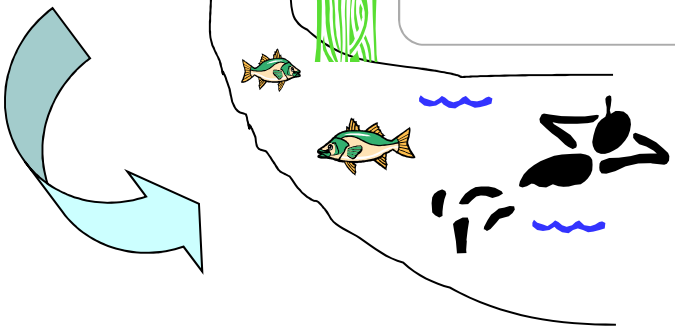
- Stressor Analysis
- ID pollutant sources
- Determine pollutant reductions

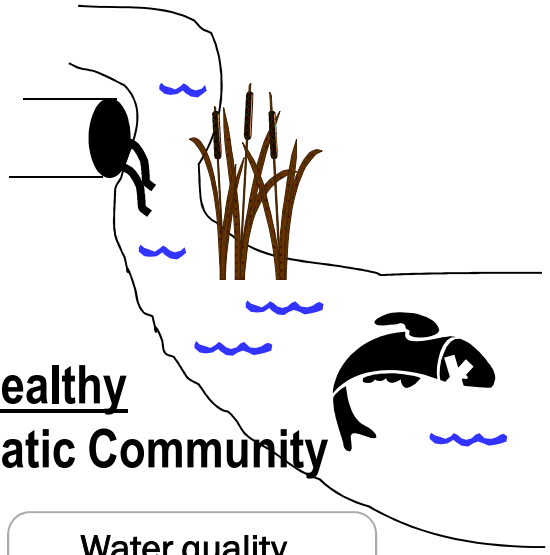
- Identify Best Management Practices (BMPs) to reduce pollutant levels
- Find $$$ Sources

Implement BMPs!

Healthy
Aquatic Community

Water quality standards met!





Unhealthy
Aquatic Community

Water quality standards not met

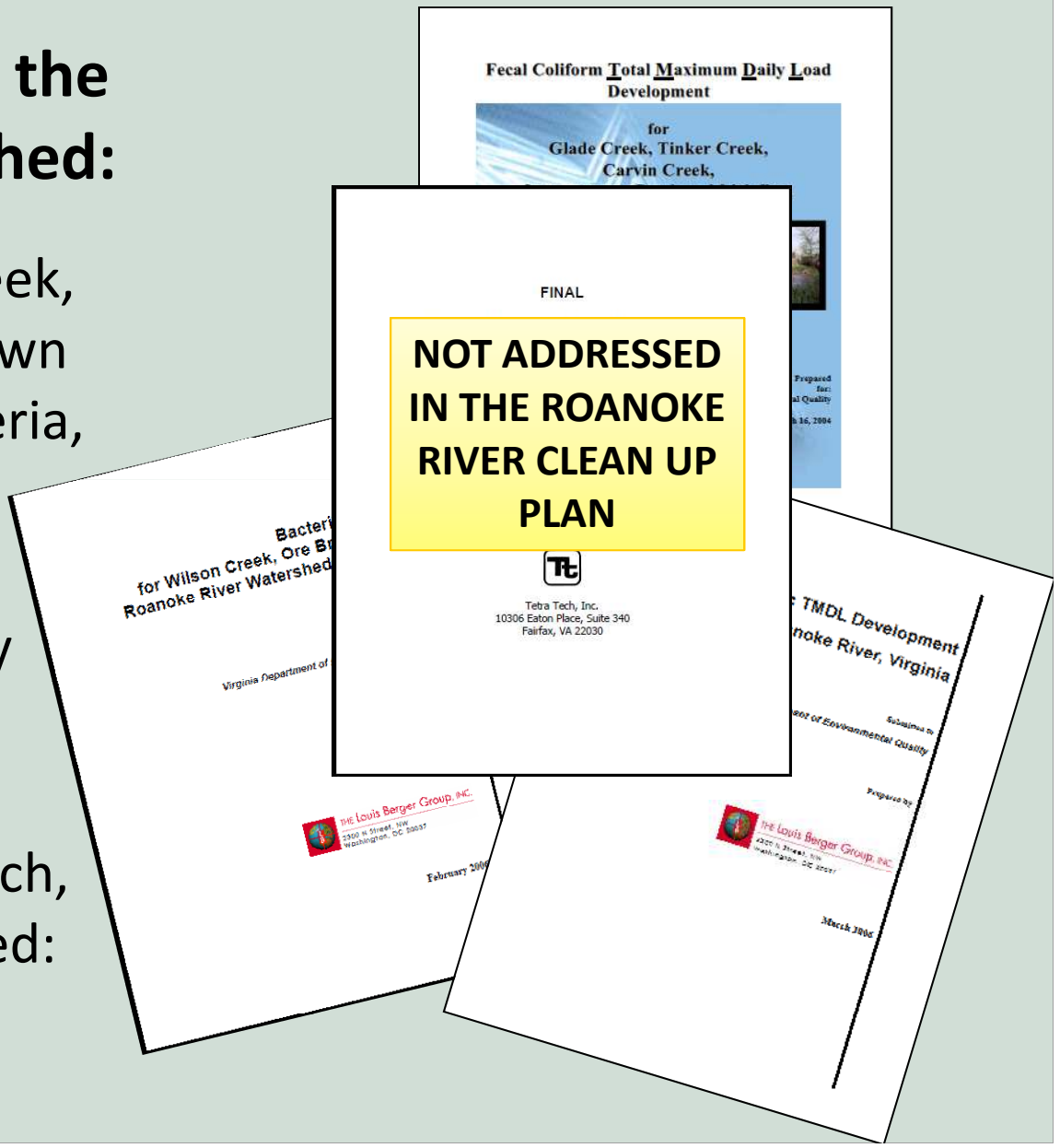
The TMDL Process

Graphic adapted from Dr. Robert Brent, Virginia DEQ

Roanoke River Watershed TMDLs

TMDL Development in the Roanoke River Watershed:

- Glade Creek, Tinker Creek, Carvin Creek, Laymantown Creek, & Lick Run: Bacteria, 2004
- Roanoke River: Aquatic invertebrate community impairment (caused by sediment), 2006
- Wilson Creek, Ore Branch, Roanoke River watershed: Bacteria, 2006

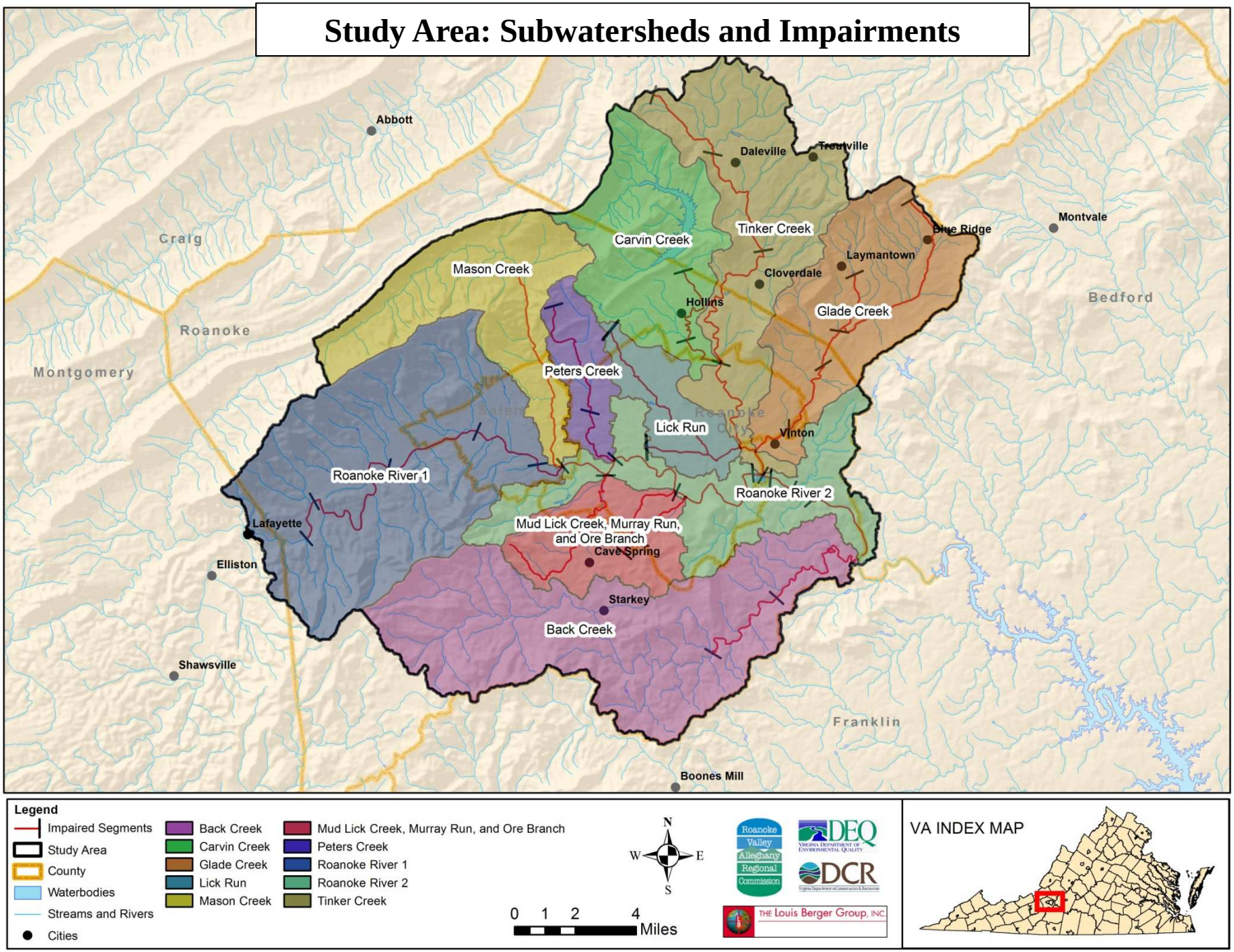


Roanoke River Clean up Plan

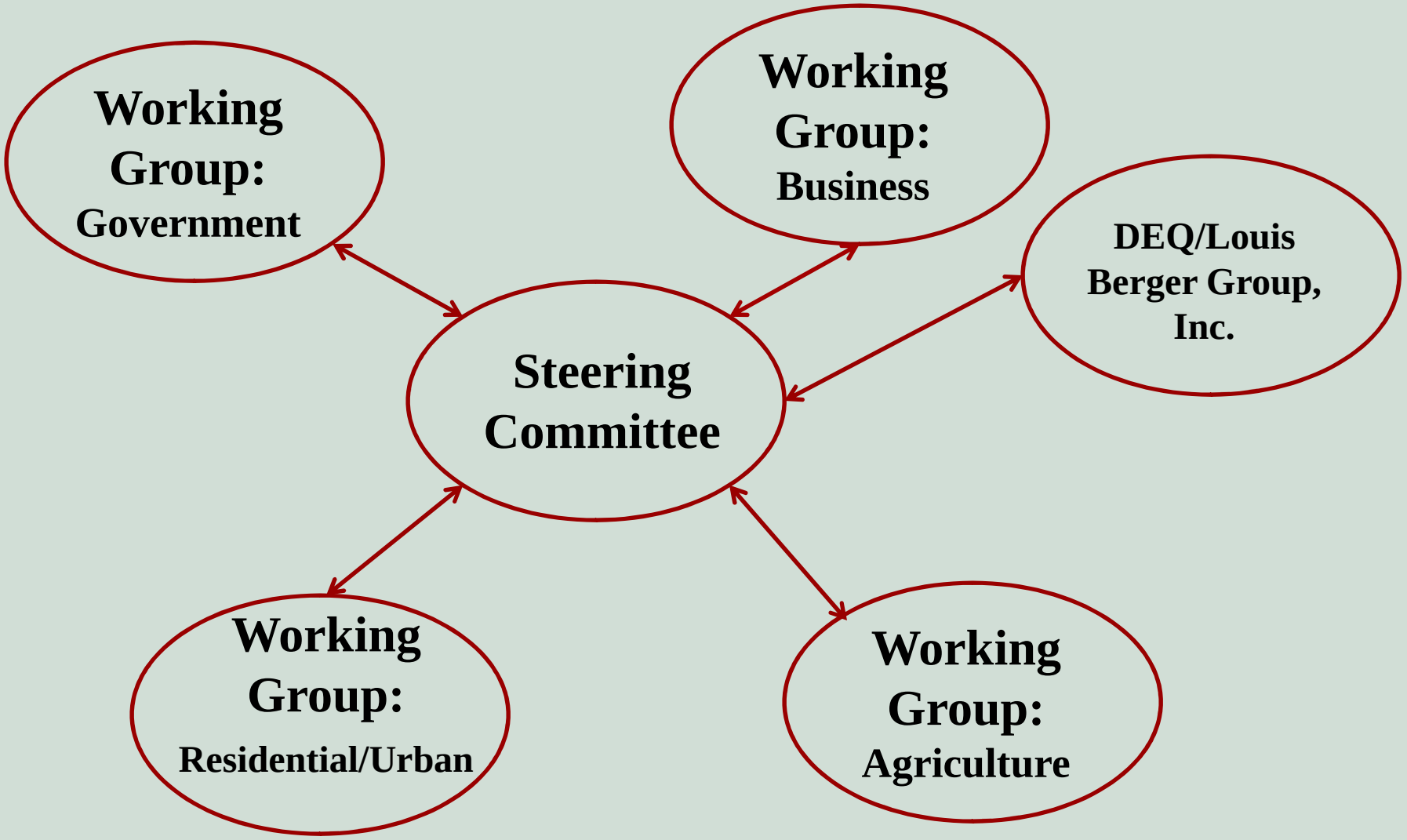
- A “road map” to implement the sediment and bacteria reductions called for in the Total Maximum Daily Load (TMDL) studies
- ALL Clean-up Plans include:

1. Executive Summary
2. Introduction
3. State and Federal Requirements
4. Review of TMDL(s)
5. Public Participation
6. Implementation Actions
7. Measurable Goals & Milestones
8. Stakeholders’ Roles & Responsibilities
9. Integration with Other Watershed Plans
10. Potential Funding Sources

Study Area: Subwatersheds and Impairments



Roanoke River Watershed Clean up Plan: Public Participation



Roanoke River Clean up Plan

- Public participation recap:
  - Clean up Plan Kick-off Meeting: 4/2013
  - Roanoke River Watershed Open House: 6/2013
  - Working Group Meetings:
    - Agricultural/Residential, Business: 2/2013 and 2/2014
    - Government: 8/2013 and 2/2014
    - Steering Committee: 11/2013 and 8/2014

Working Group Reports

- Agricultural/Residential
- Business
- Government

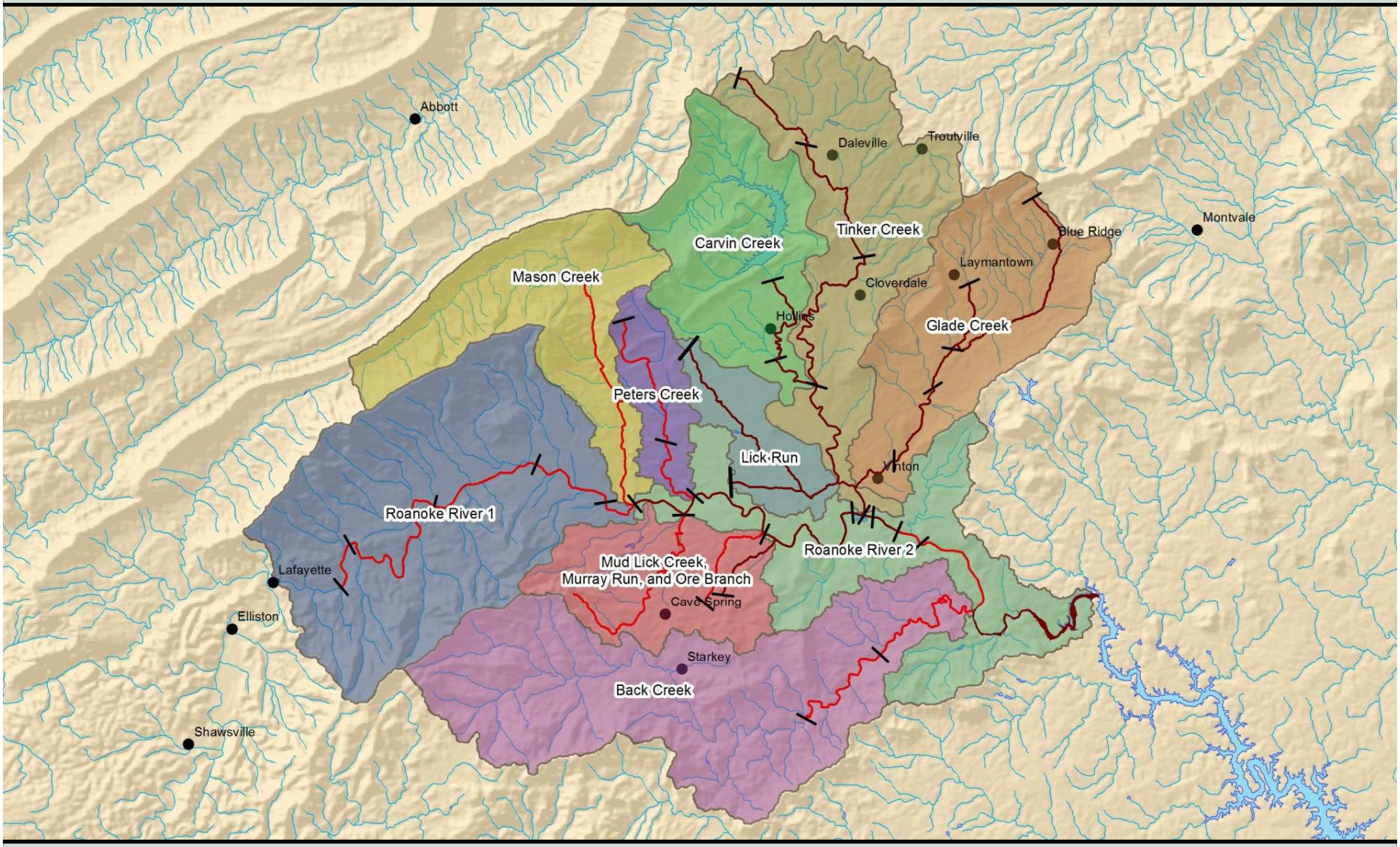
Adaptive Implementation Approach

Overarching Project Goal is to Design a Clean-up Plan including:

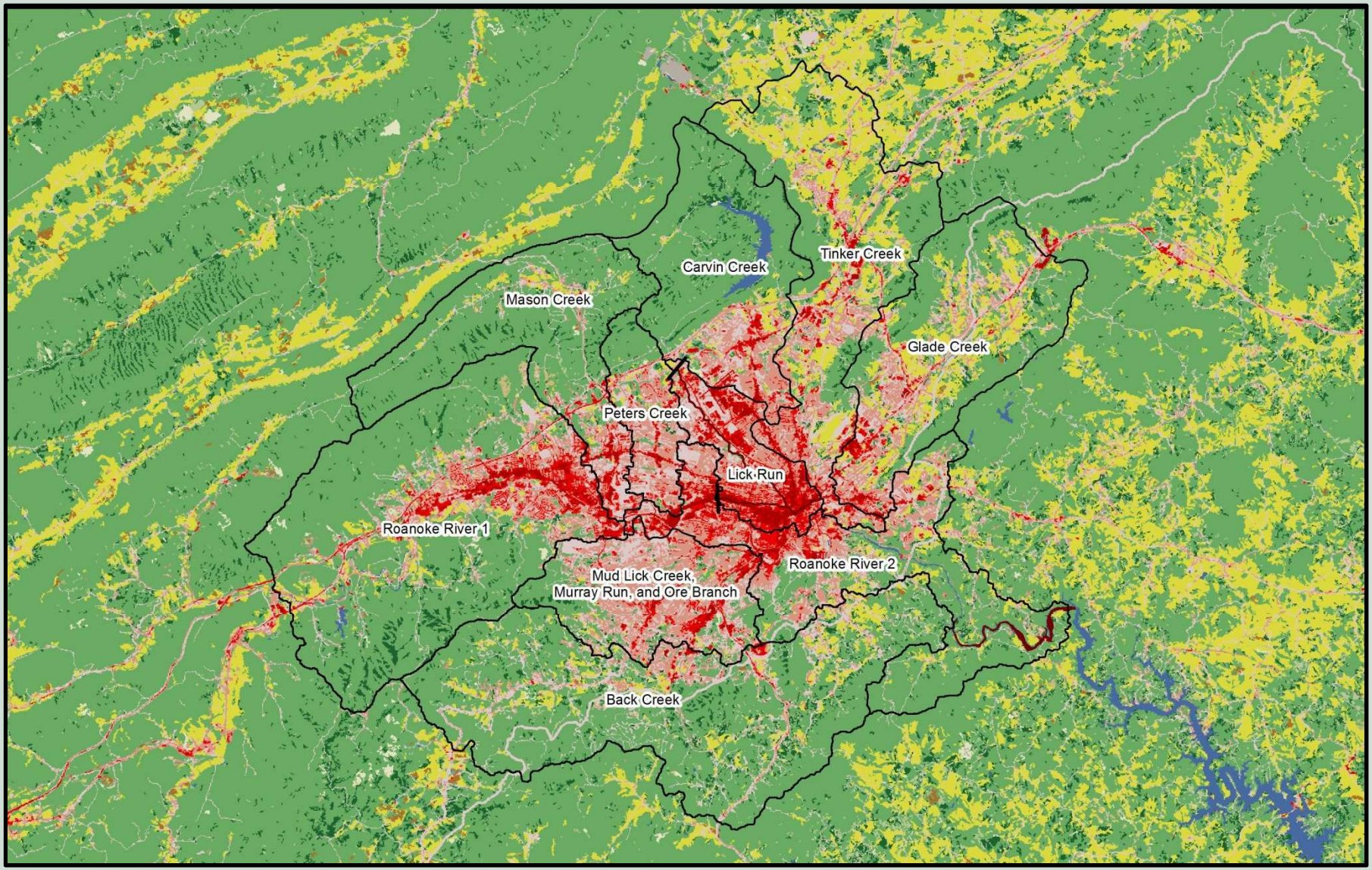
- Appropriate types and numbers of Best Management Practices designed to meet sediment and bacteria reduction goals called for in the Roanoke River watershed TMDL Reports
- Measurable Goals and Milestones for achieving water quality goals
- List and description of potential funding sources

- **Meeting Goals**: Discuss revised estimates of Best Management Practices by subwatershed that will result in reductions of bacteria and sediment loads to meet TMDLs.

Overview of the Watershed



NLCD 2006 Landuse



Roanoke River Watershed Allocations

TMDL Bacteria Reductions by Source										
Source	Back Creek	Carvin Creek	Glade Creek	Lick Run	Mason Creek	Mud Lick Creek, Murray Run, and Ore Branch	Peters Creek	Roanoke River 1	Roanoke River 2	Tinker Creek
Developed	**98.9%**	**90.2%**	**96.3%**	**98.5%**	**98.9%**	**99.6%**	**98.9%**	**96.5%**	**98.2%**	**98.6%**
Cropland	**98.9%**	**0.0%**	**96.3%**	**0.0%**	**98.9%**	**99.6%**	**0.0%**	**96.5%**	**98.2%**	**99.8%**
Pasture/Hay	**98.9%**	**90.2%**	**96.3%**	**91.0%**	**98.9%**	**99.6%**	**98.9%**	**96.5%**	**98.2%**	**99.8%**
Forest	98.9%	85.2%	91.5%	0.0%	98.9%	99.6%	98.9%	96.5%	98.2%	95.0%
Water/Wetlands	0.0%	85.2%	91.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	95.0%
Other	98.9%	90.2%	96.3%	0.0%	98.9%	99.6%	98.9%	96.5%	98.2%	98.0%
Livestock Direct	100.0%	100.0%	100.0%	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Wildlife Direct	64.5%	75.0%	70.0%	0.0%	65.1%	87.9%	53.7%	67.1%	66.0%	0.0%
Failing Septic Systems	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Roanoke River TMDL Sediment Reductions		
Landuse Category		**Percent Reduction**
Land Sources	**Developed**	**75%**
	Cropland	**75%**
	Pasture/Hay	**75%**
	Forest	75%
	Water/Wetlands	0%
	Other	75%
Instream Erosion	-	75%

Residential BMPs

Sewage Disposal

- Septic System Pump out (RB-1)
  - 10% of All Septic Systems
- Sewer Connection (Targeted Areas and RB-2)
  - Targeted Approach based on VDH consultation
- Repaired Septic System (RB-3)
- Septic System Installation/Replacement (RB-4)
- Alternative Waste Treatment System Installation (RB-5)
  - 5% of all failing septic systems

Residential BMPs

Pet Waste

- Pet Waste Stations
  - Focused on Parks, Trails and Pet Friendly Apartments and Hotels
  - Accounted for established Pet Waste Stations in Watersheds
- Educational Campaign
  - Proposed one campaign per subwatershed (increased price since last scenario)

Stormwater

- Rain gardens
- Vegetated Swales

Urban BMPs

Existing Stormwater BMPs

- Accounted for installed BMPs at ½ normal efficiency

Stormwater Retrofits

- Infiltration Basin/Trench Retrofit
- Constructed Wetland Retrofit

New Stormwater BMPs

- Bioretention
- Rain Garden
- Infiltration Basin/Trench
- Manufactured BMP
- Constructed Wetland
- Detention Ponds

Urban BMPs

New Stormwater BMPs (continued)

- Riparian Buffer (Forested or Grass/Shrub)
- Street Sweeping
- Vegetated Swales

Agricultural BMPs

Livestock Exclusion and Manure Management

- CREP Livestock Exclusion (CRSL-6)
- Livestock Exclusion with Grazing Land Management (SL-6T)
- Small Acreage Grazing Systems (SL-6A)
- Livestock Exclusion with Riparian Buffers (LE-1T)
- Livestock Exclusion with Reduced Setback (LE-2T)
- Stream Protection/Fencing (WP-2T)
- Manure Storage (WP-4)

Agricultural BMPs

Pasture

- Vegetative Cover on Critical Areas (SL-11)
  - 10-20% of Pastureland
- Reforestation of Erodible Pasture (FR-1)
  - 5-10% of Pastureland
- Pasture Management (EQIP 528, SL-10T)
  - Remainder of Pastureland
- Wet Detention Ponds
  - Applied if Pasture Reductions could not be met through other means

Agricultural BMPs

Cropland

- Continuous No-Till (SL-15)
- Small Grain Cover Crop (SL-8)
- Permanent Vegetative Cover on Cropland (SL-1)
- Sod Waterways (WP-3)

Revised Implementation Measures from Last Scenario

- Pet Waste Stations
  - Refined approach to more targeted areas rather than a per mile basis
  - Based on Parks, Trails, Pet Friendly Hotels, and Apartment Complexes
- Bioretention Drainage Areas
  - Reduced to 5 acres (previous drainage area too high)
- Costs of certain BMPs
- Urban Riparian Buffers
  - Refined approach using the NHD stream network, urban landuse and aerial photography (very much like the Livestock Exclusion Analysis)
- Reduction of proposed detention pond retrofits based on Karst topography data layer
  - Only six detention ponds intersecting layer were found (Lick Run)

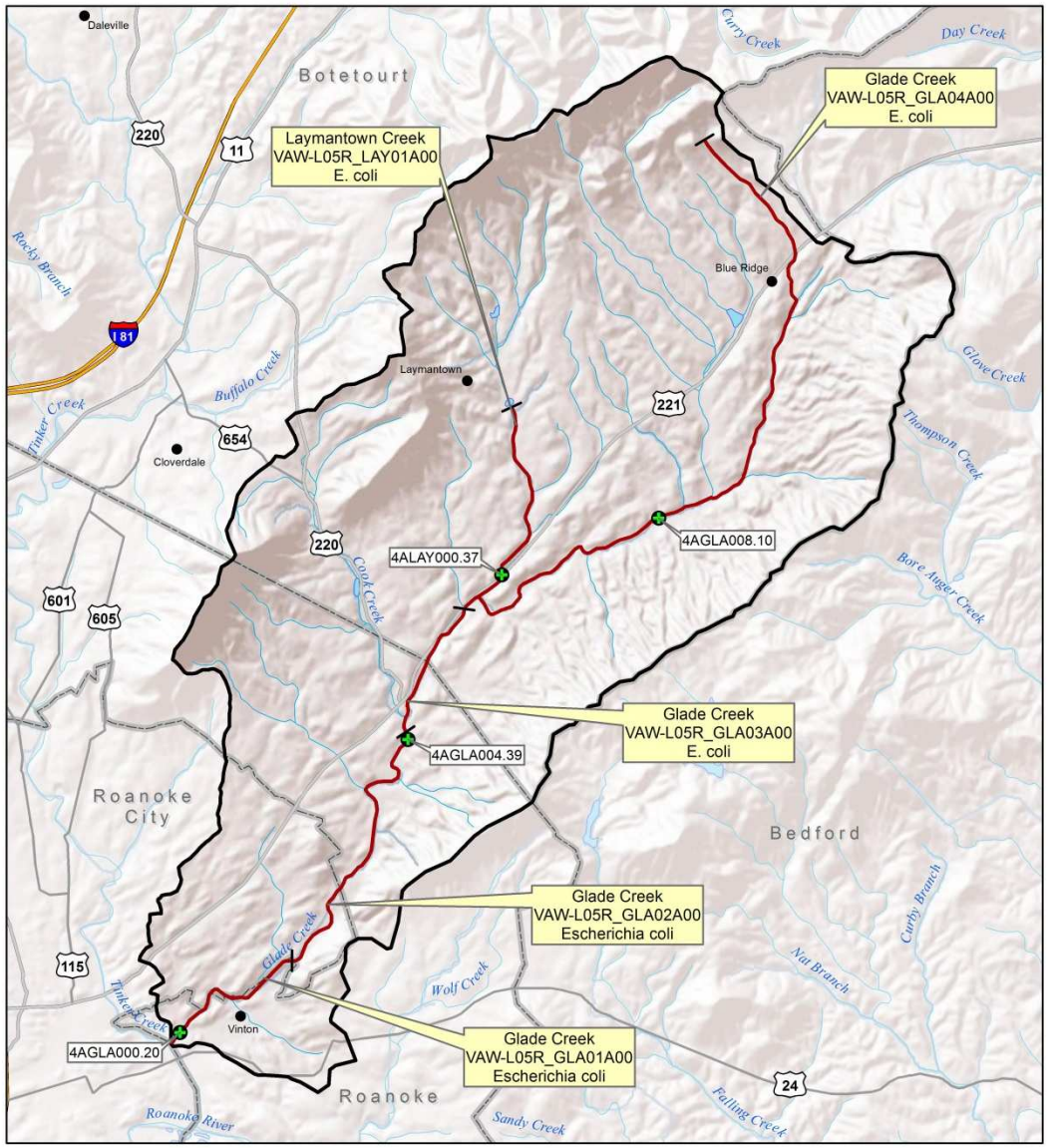
New Implementation Measures from Last Scenario

- Urban Landuse Conversion
  - Proposed 1% of potential Urban Tree Canopy to be implemented per watershed
- Permeable Pavers
  - Five units per subwatershed – expensive practice
- Detention Ponds
  - Ten units per subwatershed – not very effective at water quality but still a viable option
- Vegetated Swales
  - Ten units per subwatershed, not very effective at bacteria reduction
- Rain Barrels
  - 1% of houses per watershed to purchase rain barrels, average of two rain barrels per house.

New Implementation Measures from Last Scenario

- Street Sweeping
  - Roanoke County (creation)
    - Approximately 850 miles of road
    - Proposed to sweep half the length (425 miles)
    - Frequency of once per month
    - Removal of approximately 2,800 tons of sediment and 2.80 E+12 bacteria per year
  - City of Roanoke (expansion)
    - Frequency increased on residential streets from an average of 3.2 cycles per year to 4 cycles per year
    - Frequency increased on arterial streets from an average of 12 cycles per year to 18 cycles per year
    - Net increase of approximately 2,165 tons of sediment and 4.77E+12 bacteria per year
  - City of Salem (expansion)
    - Frequency increased: 12 cycles per year -> 18 cycles per year
    - Net increase of approximately 270 tons of sediment and 5.82E+11 bacteria per year

Glade Creek Subwatershed



Legend

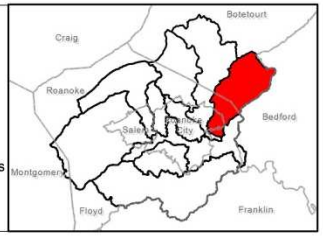
- Glade Creek Subwatershed
- Established Bacteria TMDL
- VADEQ Monitoring Stations
- Waterbodies
- Streams
- County
- Cities

Glade Creek Subwatershed Overview

N W E S

0 1 2 Miles

Sources: USGS, VADEQ, ESRI
Projection: NAD 1983 UTM Zone 17N



Glade Creek Subwatershed - Residential

Glade Creek Residential Waste Treatment BMPs			
BMP	Total Number of Systems	Cost per System	Total Cost
Septic System Pumpout (RB-1)	597	$300	$179,100
Sewer Connection (Targeted Areas and RB-2)	265	$9,500	$2,517,500
Repaired Septic System (RB-3)	511	$3,600	$1,839,600
Septic System Install/Replace (RB-4)	429	$6,000	$2,574,000
Alternative Waste Treatment System (RB-5)	45	$16,000	$720,000
		Total	$7,830,200

Glade Creek Pet Waste Programs			
BMP	Units	Cost per unit	Total Cost
Educational Campaign	1	$5,000	$5,000
Pet Waste Stations[1]	6	$4,180	$25,080
		Total	$30,080
[1]Pet Waste Stations include cost for five years of bag/liner refills			

Glade Creek Subwatershed - Urban

Glade Creek Existing Detention Pond Retrofits				
BMP	Number	Total Acres-Treated	Cost per acre treated	Total Cost
Infiltration Basin	22	421	$6,000	$2,526,000
Constructed Wetland	31	577	$2,900	$1,673,300
			Total	$4,199,300

Glade Creek Proposed Stormwater BMPs				
BMP	Number	Total Acres-Treated	Cost per acre treated	Total Cost
Bioretention	177	885	$10,000	$8,850,000
Raingarden	177	177	$5,000	$885,000
Infiltration Trench	177	176	$6,000	$1,056,000
Manufactured BMP	177	214	$20,000	$4,280,000
Constructed Wetland	140	4013	$2,900	$11,637,700
Detention Pond	10	196	$3,800	$744,800
Permeable Paver	5	5	$240,000	$1,200,000
Vegetated Swale	10	150	$18,150	$2,722,500
Rain Barrel	245	6	$150	$900
Riparian Buffer (Forested)	N/A	16	$3,500	$56,000
Riparian Buffer (Grass/Shrub)	N/A	16	$360	$5,760
			Total	$31,438,660

Glade Creek Subwatershed - Agricultural

Glade Creek Proposed Cropland BMPs			
BMP	Acres Installed	Cost per acre	Total Cost
Continuous No-Till (SL-15)	50	$100	$5,000
Small Grain Cover Crop (SL-8)	45	$30	$1,350
Permanent vegetative cover on cropland (SL-1)	3	$175	$525
Sod Waterway (WP-3)	7	$1,600	$11,200
Cropland Buffer/Field Borders (CP-33 & WQ-1)	3	$600	$1,800
		Total	$19,875

Glade Creek Proposed Pasture BMPs			
BMP	Acre Installed	Cost per acre	Total Cost
Vegetative Cover on Critical Areas (SL-11)	724	$1,200	$868,800
Reforestation of Erodible Pasture (FR-1)	402	$560	$225,120
Pasture Management (EQIP 528, SL-10T)	3,618	$75	$271,350
		Total	$1,365,270

Glade Creek Subwatershed – Livestock

Glade Creek Proposed Livestock Exclusion Systems and Manure Management					
BMP	Total Length of Proposed BMP (feet)	Average Length Per System (feet)	Systems	Cost Per System	Total Cost
CREP Livestock Exclusion (CRSL-6)	10,204	2,551	4	$27,000	$108,000
Livestock Exclusion with Grazing Land Management (SL-6T/LE-1T)	163,845	2,979	55	$21,000	$1,155,000
Livestock Exclusion with Reduced Setback (LE-2T)	10,248	1,708	6	$17,000	$102,000
Small Acreage Grazing System (SL-6AT)	8,937	2,979	3	$9,000	$27,000
Stream Protection/Fencing (WP-2T)	11,984	5,992	2	$21,000	$42,000
Manure Storage (WP-4) - Dairy	N/A	N/A	8	$100,000	$800,000
Manure Storage (WP-4) - Beef	N/A	N/A	8	$58,000	$464,000
				Total	$2,698,000
*Total Length of Proposed Livestock Exclusion = 205,218 feet					

Glade Creek Subwatershed – Other

Glade Creek Planned and Proposed Stream Restoration			
Total Estimated Stream Length for Restoration (Feet)	Planned or Ongoing Projects (feet)	Additional Proposed Stream Restoration (feet)	Cost ($300/foot of Restoration)
11,818	4,720	7,098	$2,129,400
*Total Stream Length in Watershed = 500,852 feet			

Proposed Urban Landuse Conversion based on Urban Tree Canopy (UTC) Layer		
Sum of UTC Possible Area (Acres)	1% of UTC Implemented (acres)	Total Cost ($3,500 per acre)
3,043	30	$105,000

Total cost of Glade Creek TMDL Implementation Plan = $49,815,785

Next Steps

- Finalize BMPs
  - Please submit comments by Wednesday September 10th!
- Steering Committee meeting
  - Technical Assistance
  - Refine Timelines
  - Monitoring Plan
  - Funding Sources
  - Roles and Responsibilities
- Final Public Meeting and Draft Clean-up Plan
  - 30 day public comment period
- Final Clean-up Plan submittal to State Water Control Board & EPA

Project Timeline

April
Kick-Off Meeting:
Introduce local agencies, governm… and NGOs Implementatio… Process

June
AG, Resid., Business Working Group Meetings:
Discuss potential best management practices and Outreach activities

November
Steering Committee Meeting
Prioritize Best Management Practices, discuss funding sources & timeline

Steering Committee Mtg &Public Meeting:
Present Draft Clean up Plan to Citizens of the watersheds!

2014

APRIL/MAY	JUNE	JULY/AUG.	FALL/WINTER 2013	JAN./FEB.	SPRING/SUMMER	FALL/WINTER

June
Open House:
Introduce Clean up Plan to the Community, Working Group Sign up

August
Government Working Group Meeting:
Discuss potential best management practices and Outreach activities

February
Working Group Meetings:
Discuss implementation scenarios, cost, funding

Steering Committee Meeting
Address any additional challenges, Discuss timeline And TA

Public Comment period ends 30 days after Final Public Meeting.

NEXT STEP:
Finalize Clean up Plan, begin implementing Best Management Practices! Kick off N. and S. Forks Roanoke Clean up Plan…

Contacts

Mary Dail, VA DEQ
3019 Peters Creek Road
Roanoke, VA 24019
Phone: 540.562.6715
Email: Mary.Dail@deq.virginia.gov

Reports/presentations available at:

http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLImplementation/TMDLImplementationProgress.aspx

The Louis Berger Group, Inc.
Nick Tatalovich
(202) 303-2845
ntatalovich@louisberger.com